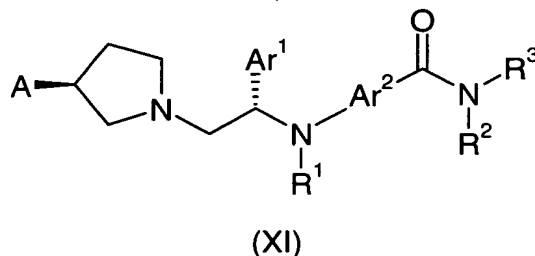


### Claims

1. A single-step or multi-step process for the preparation of a compound of formula (XI):



or a stereoisomer thereof, wherein;

10 A is hydrogen, hydroxy, C<sub>1</sub>-C<sub>6</sub> (preferably C<sub>1</sub>-C<sub>4</sub>) alkyl, C<sub>1</sub>-C<sub>6</sub> (preferably C<sub>1</sub>-C<sub>4</sub>) fluoroalkyl (particularly -CF<sub>3</sub>), C<sub>1</sub>-C<sub>6</sub> (preferably C<sub>1</sub>-C<sub>4</sub>) alkoxy, or OY wherein Y is a hydroxy protecting group or A, taken together with its geminal hydrogen, is an oxo group;

15 Ar<sup>1</sup> is phenyl optionally substituted by one or more (preferably one to two) substituents selected from fluoro, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, C<sub>1</sub>-C<sub>4</sub> alkoxy-C<sub>1</sub>-C<sub>4</sub> alkoxy, trifluoromethyl, carboxy-C<sub>1</sub>-C<sub>4</sub> alkoxy and C<sub>1</sub>-C<sub>4</sub> alkoxycarbonyl-C<sub>1</sub>-C<sub>4</sub> alkoxy;

20 Ar<sup>2</sup> is phenyl, naphthyl, pyridyl, thienyl, furyl, pyrrolyl or pyrimidyl, each being optionally substituted by one or more (preferably one to two) substituents selected from fluoro, C<sub>1</sub>-C<sub>4</sub> alkyl, C<sub>1</sub>-C<sub>4</sub> alkoxy, di(C<sub>1</sub>-C<sub>4</sub>)alkylamino and C<sub>1</sub>-C<sub>4</sub> fluoroalkyl;

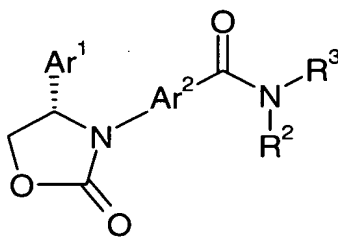
25 R<sup>1</sup> is C<sub>1</sub>-C<sub>6</sub> alkyl or benzyl wherein the phenyl moiety of said benzyl is optionally substituted with C<sub>1</sub>-C<sub>6</sub> alkoxy or OY wherein Y is a hydroxy protecting group; and

$R^2$  and  $R^3$  are independently selected from hydrogen,  $C_1$ - $C_7$  alkyl optionally substituted by one or more (preferably one to five) hydroxy or halo groups,  $C_3$ - $C_6$  cycloalkyl,  $C_2$ - $C_6$  alkenyl,  $C_2$ - $C_6$  alkynyl,  $C_1$ - $C_7$  (preferably  $C_1$ - $C_5$ ) alkoxy, phenyl optionally substituted by fluoro (preferably substituted by one or two fluoro groups), phenyl- $C_1$ - $C_7$  (preferably  $C_1$ - $C_5$ ) alkyl wherein the phenyl group is optionally substituted by fluoro, and  $-(CH_2)_nX-R^4$  wherein  $n$  is one or two,  $X$  is O or S and  $R^4$  is  $C_1$ - $C_3$  alkyl, or, when  $Ar^2$  is phenyl,  $-Ar^2-C(=O)-N(R^2)-$  is a phthalimide group and  $R^3$  is  $C_1$ - $C_7$  alkyl; or

$R^2$  and  $R^3$ , together with the nitrogen atom to which they are attached, form a pyrrolidine, piperidine or morpholine ring, optionally substituted by  $C_1$ - $C_3$  alkyl or fluoro;

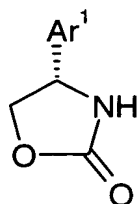
comprising a step in which the  $N-Ar^2$  bond is constructed by a copper-mediated aryl amination.

2. A process as claimed in claim 1 wherein a compound of formula (IV):



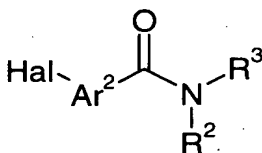
(IV)

or the enantiomer thereof, wherein  $Ar^1$ ,  $Ar^2$ ,  $R^2$  and  $R^3$  are as defined in claim 1, is prepared by treating a compound of formula (II):



(II)

or the enantiomer thereof, wherein Ar<sup>1</sup> is as defined in claim 1, with a  
5 compound of formula (III):



(III)

10 wherein Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1 and wherein one unsubstituted position on the Ar<sup>2</sup> moiety is substituted with a halogen group Hal, preferably Cl, Br or I, most preferably Br, in the presence of a cuprous salt, an amino ligand and a base.

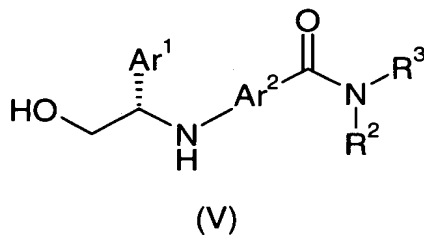
15 3. A process as claimed in claim 2 wherein the cuprous salt is CuI, CuBr or CuCl.

4. A process as claimed in claim 2 wherein the amino ligand is 1,2-diaminocyclohexane.

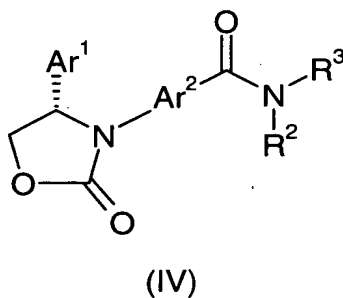
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5. A process as claimed in claim 2 wherein the base is sodium carbonate, potassium carbonate or cesium carbonate.

6. A process as claimed in claim 1 wherein a compound of formula  
25 (V):

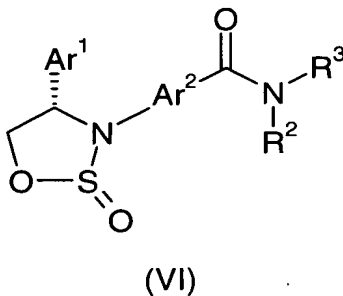


or the enantiomer thereof, wherein Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in  
5 claim 1, is prepared by treating a compound of formula (IV):



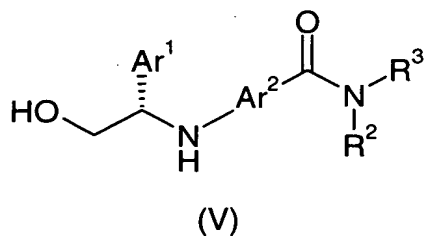
10 or the enantiomer thereof, wherein Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in  
claim 1, with a base in the presence of water.

7. A process as claimed in claim 1 wherein a compound of formula  
formula (VI):



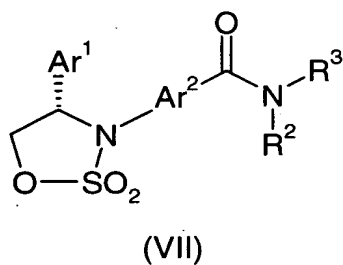
15 wherein Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1, or the enantiomer  
thereof, is prepared by treating a compound of formula (V):

20

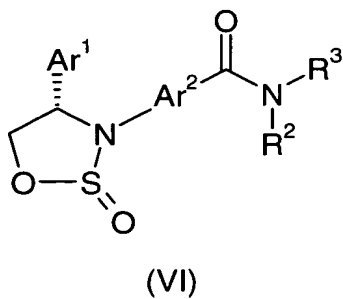


5 or the enantiomer thereof, wherein  $Ar^1$ ,  $Ar^2$ ,  $R^2$  and  $R^3$  are as defined in claim 1, with a thionyl halide.

8. A process as claimed in claim 1 wherein a compound of formula  
 10 (VII):



15 wherein  $Ar^1$ ,  $Ar^2$ ,  $R^2$  and  $R^3$  are as defined in claim 1, or the enantiomer thereof, is prepared by oxidising a compound of formula (VI):



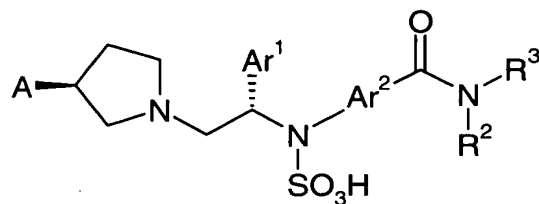
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wherein  $Ar^1$ ,  $Ar^2$ ,  $R^2$  and  $R^3$  are as defined in claim 1, or the enantiomer

thereof.

9. A process as claimed in claim 1 wherein a compound of formula (IX):

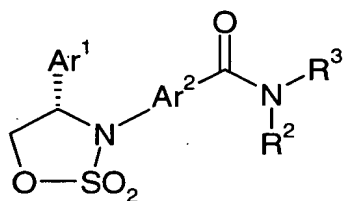
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(IX)

wherein A, Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1, or a zwitterion thereof, or a stereoisomer of either, is prepared by treating a compound of formula (VII):

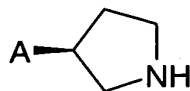
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(VII)

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wherein Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1, or the enantiomer thereof, with a compound of formula (VIII):

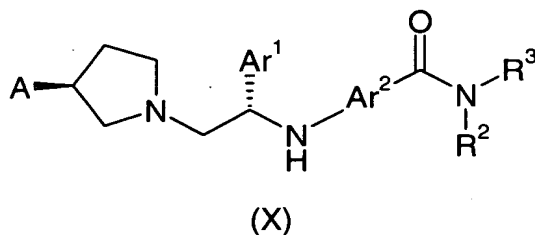


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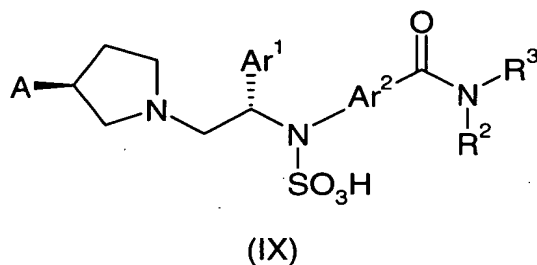
(VIII)

wherein A is as defined in claim 1, or the enantiomer thereof.

10. A process as claimed in claim 1 wherein a compound of formula (X):



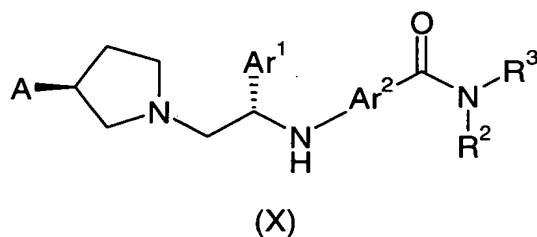
wherein A, Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1, or a stereoisomer thereof is prepared by hydrolytically cleaving the -SO<sub>3</sub>H group in a compound of formula (IX):



15 wherein A, Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1, or a zwitterion thereof, or a stereoisomer of either.

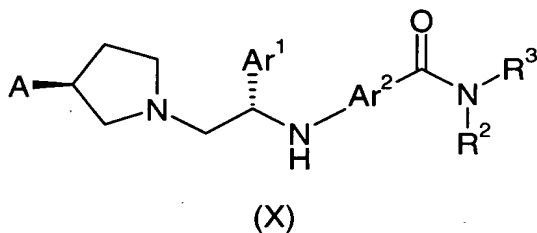
11. A process as claimed in claim 1 wherein a compound of the formula (XI), as defined in claim 1, or a stereoisomer thereof, is prepared by the reductive alkylation of a compound of formula (X):

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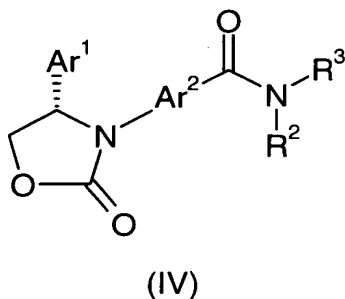
wherein A, Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined above, or a stereoisomer thereof.

12. A process for the preparation of a compound of formula (XI), as defined in claim 1, or a stereoisomer thereof, comprising the reductive amination of a compound of formula (X):



or a stereoisomer thereof, wherein A, Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1.

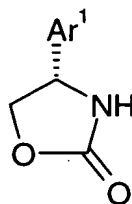
13. A process for the preparation of a compound of formula (IV):



or the enantiomer thereof, wherein Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in



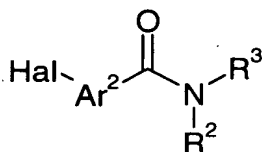
claim 1, comprising treating a compound of formula (II):



(II)

5

or the enantiomer thereof, wherein Ar<sup>1</sup> is as defined in claim 1, with a compound of formula (III):



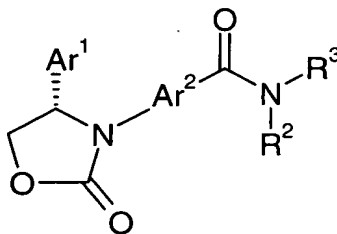
(III)

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wherein Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1 and wherein one unsubstituted position on the Ar<sup>2</sup> moiety is substituted with a halogen group Hal, preferably Cl, Br or I, most preferably Br, in the presence of a cuprous salt, an amino ligand and a base.

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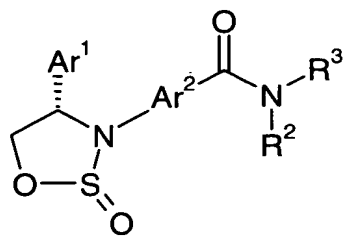
14. A compound of formula:



(IV)

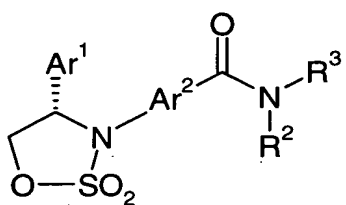
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or



(VI)

or



(VII)

wherein Ar<sup>1</sup>, Ar<sup>2</sup>, R<sup>2</sup> and R<sup>3</sup> are as defined in claim 1.